

**REMARKS**

Claims 1 through 9 are currently pending in the application.

This amendment is in response to the final Office Action of August 2, 2004.

**35 U.S.C. § 103(a) Obviousness Rejections**

Obviousness Rejection Based on Watts, Jr. et al. (U.S. Patent 6,276,589) in view of Doran et al. (U.S. Patent 5,585,629)

Claims 1 through 9 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Watts, Jr. et al. (U.S. Patent 6,276,589) in view of Doran et al. (U.S. Patent 5,585,629).

Applicant respectfully traverses this rejection, as hereinafter set forth.

Applicant asserts that to establish a *prima facie* case of obviousness under 35 U.S.C. § 103 three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Third, the cited prior art reference must teach or suggest all of the claim limitations. Furthermore, the suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on Applicant's disclosure.

Turning to the cited prior art, Watts teaches or suggests a jet soldering system including a solder ejector 12 for providing a continuous stream of charged solder droplets 14, deflecting plates 16, 18 for passing the charged solder droplets through to a gutter 20 or deflecting the droplets towards a substrate and an x-y translation table on which the substrate is mounted moving the substrate during the deposition process (Fig. 1, col. 3, lines 43-48 and col. 4, lines 17-21). The ejector 12 includes heaters 32, 34 to melt solder in a cartridge 77 contained therein, a gas pressure line 44 for pressurizing the molten solder and a piezoelectric vibrator 31 to produce a standing wave in the stream of solder leaving the ejector (col. 3, line 54 - col. 4, line 5). The solder droplets 14 are deflected in the Y-direction by the deflecting plates 16, 18 while the translation table on which the substrate is mounted moves in the X-direction for the solder droplets to strike the substrate at the desired location. Watts contains no disclosure whatsoever

for raster scanning a stream of liquid solder metal droplets because Watts contains on one set of deflection plates, not two.

Doran et al. teaches or suggests an electron beam metrology tool including an ambient temperature electron source and a movable stage for mounting a workpiece. The electron beam 70 is scanned over a very small beam interrogation region (on the order of several microns), relying principally upon stages 32 and 30 to achieve proper positioning of workpiece 22 into the beam interrogation region. Doran et al. contains no teaching or suggestion of using any type beam but an electron beam.

After carefully considering the cited prior art, the rejections, and the Examiner's comments, Applicant has amended the claimed invention to clearly distinguish over the cited prior art.

Applicant asserts that any combination of Watts and Doran et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the claimed invention because, at the very least, any combination of Watts and Doran et al. does not contain any suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the Watts reference or to combine reference teachings of Watts and Doran et al., there has been no showing of any a reasonable expectation of success for any combination of Watts modified in view of Doran et al. and any combination of Watts and Doran et al does not and cannot teach or suggest all of the claim limitations. Furthermore, Applicants asserts that the suggestion to make the claimed combination and the reasonable expectation of success is not and cannot both be found in the prior art, but, rather, is based solely on Applicant's disclosure.

Again, turning to the three criteria of obviousness, Applicant respectfully submits that a *prima facie* case of obviousness under 35 U.S.C. § 103 cannot be established with respect to presently amended independent claim 1 because there is no teaching or suggestion in Watts or Doran et al. or any combination of Watts and Doran et al. to extend the method of Watts to two dimensional deflection, *the knowledge available to one skilled in the art* would also not recommend a second pair of deflection plates because the practitioner would recognize the accompanying limitation in the x and y range, there is no expectation of success for any

modification of Watts because most of the x-y plane would be inaccessible, the cited prior art does not teach or suggest all the claim limitations of the presently claimed invention, and any rejection of the presently claimed invention based upon Watts would be a hindsight reconstruction of the claimed invention based solely upon Applicant's disclosure.

Applicant asserts that there is no suggestion whatsoever in Watts or Doran et al. or any combination of Watts and Doran et al. for any modification thereof or in the knowledge generally available to one of ordinary skill in the art. It has been asserted that it would be obvious to simply extend the one dimensional deflection method of Watts by adding a second pair of deflection plates, and thereby gain a controlled deflection in an additional dimension. It has been asserted that the addition of a second pair of deflection plates "merely a duplication of parts. The practitioner would allegedly thus arrive at Applicant's invention, which requires "selectively deflecting" the solder droplets in two dimensions. See claim 1. (Watts actually teaches a method for applying solder which gains a second dimension of controllability by moving the table, in the dimension perpendicular to the deflection direction, the X-direction, which supports the surface to which the solder is being applied.)

However, the method of Watts differs from Applicant's presently claimed method of presently amended independent claim 1. Watts controls the direction of falling solder droplets by controlling the charge on the droplet. See column four, lines 25 through 30 of Watts where it is stated that "[t]he charge on each droplet controls whether the solder droplet 14 is passed undeflected toward the substrate along the y-axis while the table is moved along the x-axis. The magnitude of the charge determines the extent of deflection along the y-axis."

Applicant, in contrast, controls the deflection of the solder droplet by varying the electric field between the deflection plates. Please see Applicant's specification at paragraph [0020] where it states the following: "Signal controller 34 can be programmed to perform a variety of soldering patterns for placing droplets 14 on substrate 12. For example, a CAD/CAM system programmed with a desired output sends signals to ... deflection plates 36 to guide the droplet stream in the desired pattern of placing droplets in certain locations, but not in others." Applicant has amended claim 1 to include the charging of drops.

Because Watts teaches deflection by variation of droplet charge, the practitioner cannot extend the teachings of Watts to arrive at Applicant's invention. If Watts is modified by substituting an additional pair of deflection plates for the moving table, one of ordinary skill in the art will actually *lose* the ability to deposit solder over the entirety of the x-y two dimensional plane. It should be evident that for a given pair of potentials (one corresponding to the x deflection, the other corresponding to the y deflection) a set of droplets with charges spanning the range of all possible charges will fall on a curved line in the x-y plane, and the remainder of the x-y plane will be inaccessible. However, because Applicant teaches the variation of the electric field between the deflection plates, Applicant's invention can easily accommodate an additional dimension with an additional pair of deflection plates without losing the ability to deposit solder over the entire x-y plane in a raster fashion. In essence, with Applicant's presently claimed method, the x-deflection is independent from the y-deflection, rather than having both deflections bound up with the charge on the droplet. If it were to be argued that the "knowledge available to one skilled in the art" would lead one to simply add a pair of variable potential plates to the method of Watts, the combination would still not give Applicants invention for lack of teaching or suggesting that the first pair of plates is variable potential. Furthermore, Applicant asserts that there is no motivation for any one of ordinary skill in the art to resort to an electron beam measuring device as set forth in Doran et al. which deflects the beam a few microns in measuring a feature on a substrate to attempt to incorporate any feature thereof in a molten solder drop apparatus.

Applicant asserts that the only suggestion can solely be Applicant's disclosure, not the cited prior art as electron beam measuring is not molten solder drop deposition.

Further, any combination of Watts and Doran et al. differs from Applicant's presently claimed invention of presently amended independent claim1. Both Watts and Doran et al. move the support on which the substrate is mounted whereas the Applicant's presently claimed invention includes as a claim limitation "positioning a substrate on a stationary support" and "maintaining said substrate in a stationary position on the stationary support" .

Therefore, any combination of Watts and Doran et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention

of presently amended independent claim 1. Accordingly, presently amended independent claim 1 is allowable as well as dependent claims 2 through 9 therefrom.

Applicant further asserts that there has been and can be no showing of success for any modification of Watts based upon Doran et al. because any modification of Watts would destroy the teachings of Watts. As previously stated, because Watts teaches deflection by variation of droplet charge, the practitioner cannot extend the teachings of Watts to arrive at Applicant's invention. If Watts is modified by substituting an additional pair of deflection plates for the moving table, one of ordinary skill in the art will actually *lose* the ability to deposit solder over the entirety of the x-y two dimensional plane. It should be evident that for a given pair of potentials (one corresponding to the x deflection, the other corresponding to the y deflection) a set of droplets with charges spanning the range of all possible charges will fall on a curved line in the x-y plane, and the remainder of the x-y plane will be inaccessible.

Further, Applicant asserts that any possible allegation for any success for any combination of the cited prior art comes solely from Applicant's disclosure, not the cited prior art because electron beam measuring is not molten solder drop deposition.

Therefore, any combination of Watts and Doran et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention of presently amended independent claim 1. Accordingly, presently amended independent claim 1 is allowable as well as dependent claims 2 through 9 therefrom.

Applicant further asserts that any combination of Watts and Doran et al. does not teach or suggest all the claim limitations of presently amended independent claim 1 to a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention. For instance, any combination of Watts and Doran et al. does not teach or suggest the claim limitations of presently amended independent claim 1 calling for "positioning a substrate on a stationary support", "maintaining said substrate in a stationary position on the stationary support", "selectively directing said stream of liquid solder metal droplets in a first dimension and a second dimension, such that solder is deposited at said locations on a substrate located on a stationary support . . . ", "electrostatically deflecting said electrically charged stream of liquid solder metal droplets in a first variable electrostatic potential in said first dimension for contacting

portions of a substrate located on a stationary support;”, “electrostatically deflecting said electrically charged stream of liquid metal droplets in a second variable electrostatic potential in said second dimension to said locations on said substrate located on a stationary support”, and “blanking selectively said stream of liquid solder metal droplets to prevent a portion of said stream of liquid solder metal droplets from contacting said substrate located on a stationary support”.

Therefore, any combination of Watts and Doran et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention of presently amended independent claim 1. Accordingly, presently amended independent claim 1 is allowable as well as dependent claims 2 through 9 therefrom.

Additionally, Applicant asserts that any rejection of the invention of presently amended independent claim 1 would be a hindsight reconstruction of the presently claimed invention based solely upon Applicant’s disclosure, not the cited prior art because the cited prior art is devoid of any suggestion for any modification thereof. Such a rejection is neither within the ambit nor purview of 35 U.S.C. § 103 and, clearly, improper and cannot establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention.

Therefore, any combination of Watts and Doran et al. cannot and does not establish a *prima facie* case of obviousness under 35 U.S.C. § 103 regarding the presently claimed invention of presently amended independent claim 1. Accordingly, presently amended independent claim 1 is allowable as well as dependent claims 2 through 9 therefrom.

Applicant submits that claims 1 through 9 are clearly allowable over any combination of the cited prior art.

Applicant requests entry of this amendment for the following reasons:

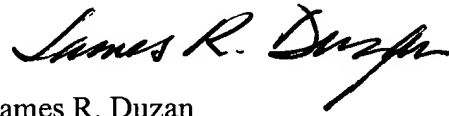
The amendment is timely filed.

The amendment places the application in condition for allowance.

The amendment does not require any further search or consideration.

Applicant requests the entry of this amendment, the allowance of claims 1 through 9, and the case passed for issue.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "James R. Duzan". The signature is fluid and cursive, with a long, sweeping underline.

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